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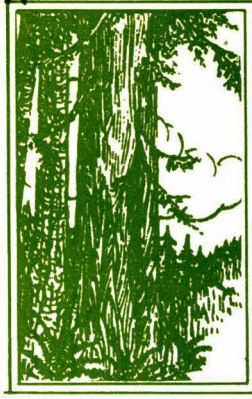
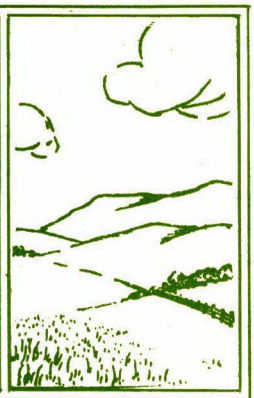


FOREST RESEARCH NOTES

U.S.DEPARTMENT OF AGRICULTURE
FOREST SERVICE
CALIFORNIA FOREST AND RANGE
EXPERIMENT STATION *

STEPHEN N. WYCKOFF, Director



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INDUCING EARLY PRODUCTION OF PINE POLLEN

By N. T. Mirov

In order to shorten the time required in producing new hybrids of pines it is necessary to have both male and female flowers as early in the life of the tree as possible. This paper describes experiments seeking to induce the formation of male flowers. It was reasoned that if young seedlings were grafted on a mature tree that produces flowers in abundance, the seedlings might produce flowers, too. Early flowering, it was thought, may be caused by the transfer of a flowering hormone across the graft and by the existence of a proper nutritional balance between carbohydrates and nitrogen in the mature tree.

From previous experience[1/] it was known that within two large subdivisions of the genus, the hard pines and the white pines, intergrafting can be done without any difficulty. The seedlings to be grafted were transplanted into gallon cans in the fall. The following spring they were grafted by inarching to a mature ponderosa pine, prolific in its production of pollen and conelets. Five transplants of each species were kept in gallon cans in the lathhouse as controls.

1/ N. T. Mirov. 1940. Tested methods of grafting pines. Journal of Forestry 38(10): 768-777.

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* MAINTAINED AT BERKELEY, CALIFORNIA, IN COOPERATION WITH THE UNIVERSITY OF CALIFORNIA.

The inarched seedlings were left in the cans for one month. After that period the grafting union was firm enough to permit clipping the seedling roots off. The shock of grafting was considerable. During the first summer the grafted seedlings just held their own, but next summer much growth took place, and the wounds completely healed and calloused. Flowering started at the beginning of the third growing season, i. e., about 2 years after the seedlings were grafted (fig. 1). None of the controls produced flowers in this period.

A few individuals among the trees planted at the Institute of Forest Genetics[2/] have produced pollen at 2 to 4 years of age; but as a general rule for the species used in this test, 7 years or more have been required for pollen production. Besides inducing early flowering, the grafting technique makes collection of experimental material more certain and convenient.

The following pine seedlings grafted on the mature ponderosa pine were caused to flower:

1. P. Torreyana Parry (Torrey pine)
2. P. contorta var. latifolia Engelm. (lodgepole pine)
3. P. sabiniana Dougl. (Digger pine)
4. P. ponderosa Laws. (ponderosa pine)
5. Hybrid between P. jeffreyi Grev. and Balf., and P. coulteri D. Don.

Grafted slash pine (P. caribaea Morelet) seedlings did not produce pollen during the 2 years. No female flowers (conelets) have been produced on the grafted seedlings, probably because the seedlings were grafted to the lower part of the crown, which was producing an abundance of male flowers, while the upper crown, as usual, produced female flowers (conelets). It is possible that the grafted seedlings received only a male flowering hormone. At present, experiments are being conducted at the Institute of Forest Genetics on inducement of female flowers.

2/ A field branch of the California Forest and Range Experiment Station located near Placerville, California.

Figure 1.-Grafting pine seedlings on a mature tree induces production of pollen and thus speeds tree-breeding work. Catkins are shown above on seedlings of: A, Pinus contorta var.latifolia; B, P. sabiniana; C, P. torreyana; D, P. Jeffreyi x P. Coulteri hybrid; all grafted on mature ponderosa pine.